What is claimed is:

1. A phosphor fluoride particle that emits light in the visible wavelength range when excited by long wavelength light that has a uniform particle size of less than 350 nanometers.

2. The phosphor fluoride particle of claim 1, comprising a phosphor host and an absorber-emitter pair.

3. The phosphor fluoride particle of claim 2, wherein the phosphor host is selected from the group consisting of yttrium, lanthanum and gadolinium.

4. The phosphor fluoride particle of claim 2, wherein the absorber is ytterbium and the emitter is selected from the group consisting of erbium, holmium, terbium and thulium.

5. The phosphor fluoride particle of claim 1, wherein the particle has a molar ratio:

(yttrium, lanthanum or gadolinium):ytterbium:(erbium, holmium, terbium or thulium) = (70-90):(0-29):(0.001-15).

6. The phosphor fluoride particle of claim 1, which has a formula of YF_3:Yb,Er.

7. The phosphor fluoride particle of claim 1, which has a formula of $NaYF_4$:Yb,Er.

8. The phosphor fluoride particle of claim 1, which has a particle size ranging from about 35 nanometers to about 200 nanometers.

9. The phosphor fluoride particle of claim 1, further comprising a transparent coating layer.

10. The phosphor fluoride particle of claim 9, wherein the transparent coating layer is SiO_2.

11. The phosphor fluoride particle of claim 9, wherein the coated particle further comprises a layer of immobilized biological moiety.

12. A process of preparing a phosphor fluoride particle that emits light in the visible wavelength range when excited by long wavelength light that has a uniform particle size of less than 350 nanometers, which process comprises:

a) preparing an aqueous solution of soluble salts of a phosphor host, an absorber/emitter pair and a rare-earth metal chelator; and

b) contacting said prepared aqueous solution of soluble salts of said phosphor host, absorber/emitter pair and rare-earth metal chelator with an aqueous fluoride-containing compound at a temperature ranging from about 0°C to about 100°C for a sufficient time to obtain a precipitate of a phosphor fluoride particle; and

c) heating said precipitate at a temperature ranging from about 300°C to about 450°C for a time ranging from about 1 hour to about 10 hours to obtain a phosphor fluoride particle that emits light in the visible wavelength range when excited by long wavelength light that has a uniform particle size of less than 350 nanometers.

13. The process of claim 12, wherein the phosphor host is selected from the group consisting of yttrium, lanthanum and gadolinium.

14. The process of claim 12, wherein the absorber is ytterbium and the emitter is selected from the group consisting of erbium, holmium, terbium and thulium.

15. The process of claim 12, wherein the rare-earth metal chelator is selected from the group consisting of ethylenediamineteraacetic acid, triethylenetetraaminhexaacetic acid, diethylenetriaminepentaacetic acid, hydroxyethylethylenediaminetriacetic acid, 1,2-diaminocyclohexanetetraacetic acid, ethylene glycol bis (b-aminoethylether) tetraacetic acid and a salt thereof.

16. The process of claim 12, wherein the aqueous fluoride-containing compound is selected from the group consisting of NaF, KF, NH_4F and HF.

17. The process of claim 12, wherein the aqueous fluoride-containing compound is contained in an aqueous solution prior to or concurrently with contacting with the prepared aqueous solution of soluble salts of the phosphor host, the absorber/emitter pair and the rare-earth metal chelator.

18. The process of claim 12, wherein the soluble salts of the phosphor host and the absorber/emitter pair are obtained by dissolving the corresponding metal oxide in hydrochloric acid or nitric acid and subsequently removing the residual acid.

19. The process of claim 12, wherein the amount of the rare-earth metal chelator is about 0-1 times the amount of total rare-earth ions in the aqueous solution.

20. The process of claim 12, further comprising coating the prepared phosphor fluoride particle with a transparent layer.

21. The process of claim 20, wherein the transparent layer is SiO_2.

22. The process of claim 20, further comprising coating the transparent layer coated phosphor fluoride particle with a layer of immobilized biological moiety.

23. A phosphor fluoride particle that is prepared by the process of claim 12.

24. The phosphor fluoride particle of claim 23, which has a molar ratio: (yttrium, lanthanum or gadolinium):ytterbium:(erbium, holmium, terbium or thulium) = (70-90):(0-29):(0.001-15).

25. The phosphor fluoride particle of claim 23, which has a formula of YF_3:Yb,Er.

26. The phosphor fluoride particle of claim 23, which has a formula of $NaYF_4$:Yb,Er.

27. The phosphor fluoride particle of claim 23, which has a particle size from about 35 nanometers to about 200 nanometers.